Research Project

Research methodology-EMPH 712

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Research Title

Standardization of national AMR surveillance system for better decision making and treatment guideline

Research Questions

- How the standardized approach to the collection, analysis and sharing of AMR data is associated with decision making in the national level policy makers?
- How the standardized approach to the collection, analysis and sharing of AMR data is associated with the local laboratories antimicrobial susceptibility test (AST) process?
- How the standardized approach to the collection, analysis and sharing of AMR data is associated with the development of the standard treatment guidelines in the national level?

General Objectives

To evaluate the standardized approach to the collection, analysis and sharing/pub of national AMR data associated with standard treatment guideline and targeted prevention and control programmes.

Specific Objectives

- To explore the association between the national level decision making and the standardized approach to the collection, analysis and sharing of AMR data
- To investigate the association between the public-private laboratories and the robust AMR surveillance system
- To identify the association between the standard treatment guidelines and the AMR surveillance system

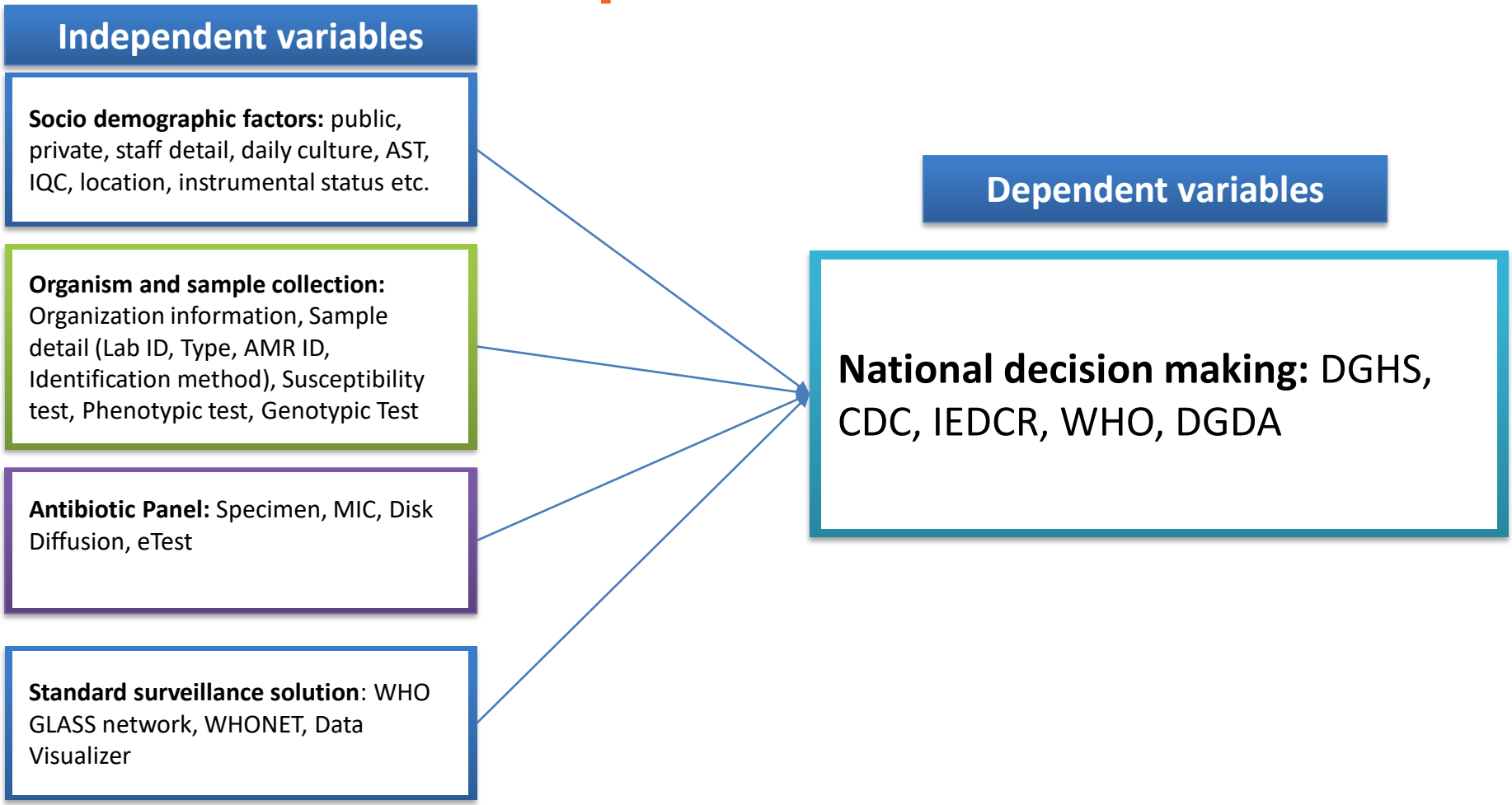
Specific Objectives (continue …)

- To find out the scope of establishing multi-sectoral approach for planning, coordination and implementation and the integrated AMR surveillance system
- To investigate the association between the quality laboratory reporting of antimicrobial susceptibility test for right selection of AMs and the standardized approach to the collection analysis and sharing of AMR data
- To explore the association between the Antibiotic Use (AMU) at the pharmacy level and the integrated surveillance system
- To explore the association between the WHO GLASS platform and the standardized approach to the collection analysis and sharing of AMR data

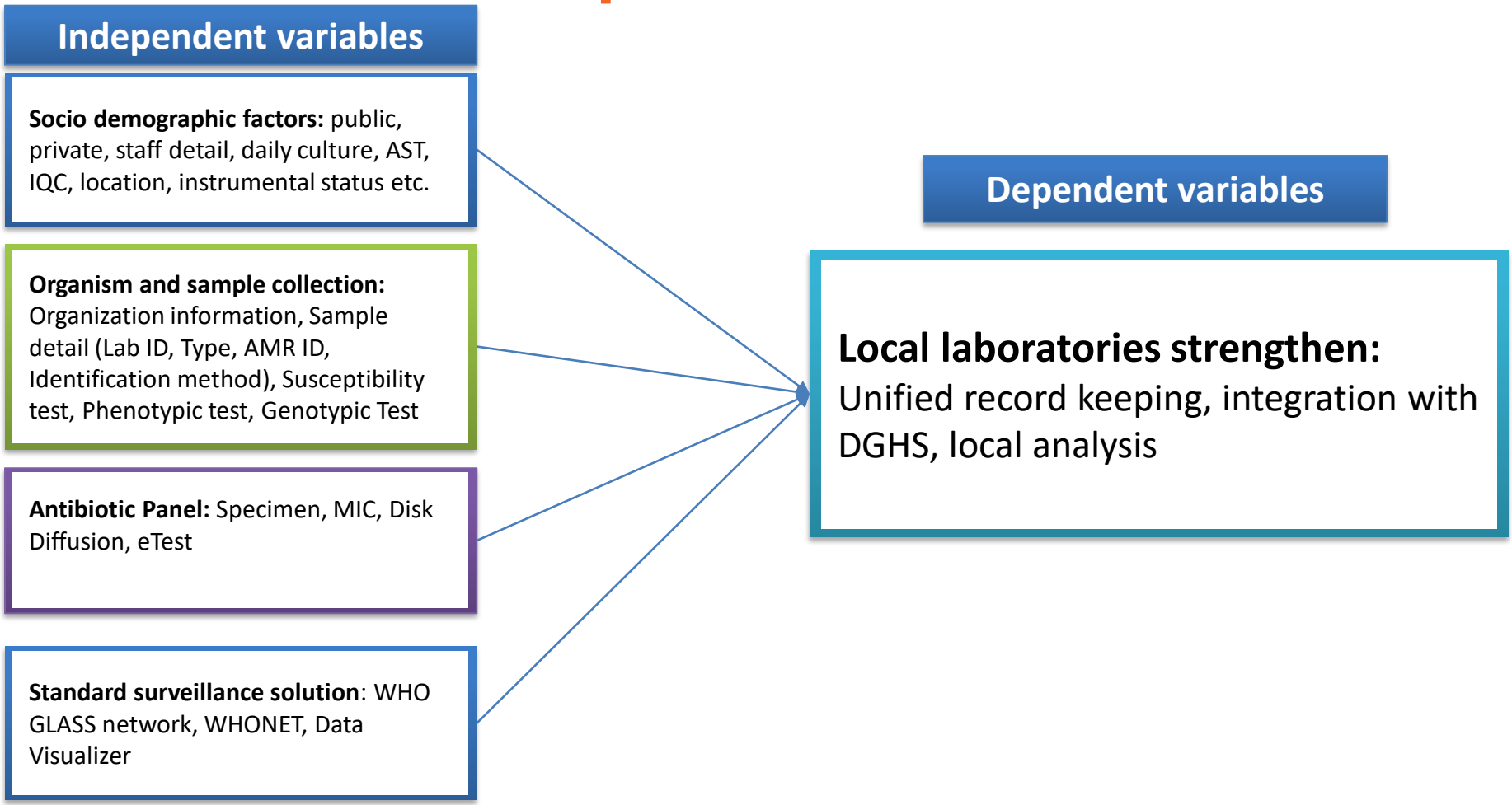
Research Hypothesis

- There is strong association between the standardized approach to the collection, analysis and sharing of AMR data and the national level decision making.
- There is strong association between the collection, analysis and sharing of AMR data and the local laboratories level antimicrobial susceptibility testing (AST).
- There is strong association between the standardized approach to the collection, analysis and sharing of AMR data and the development of standard treatment guidelines.

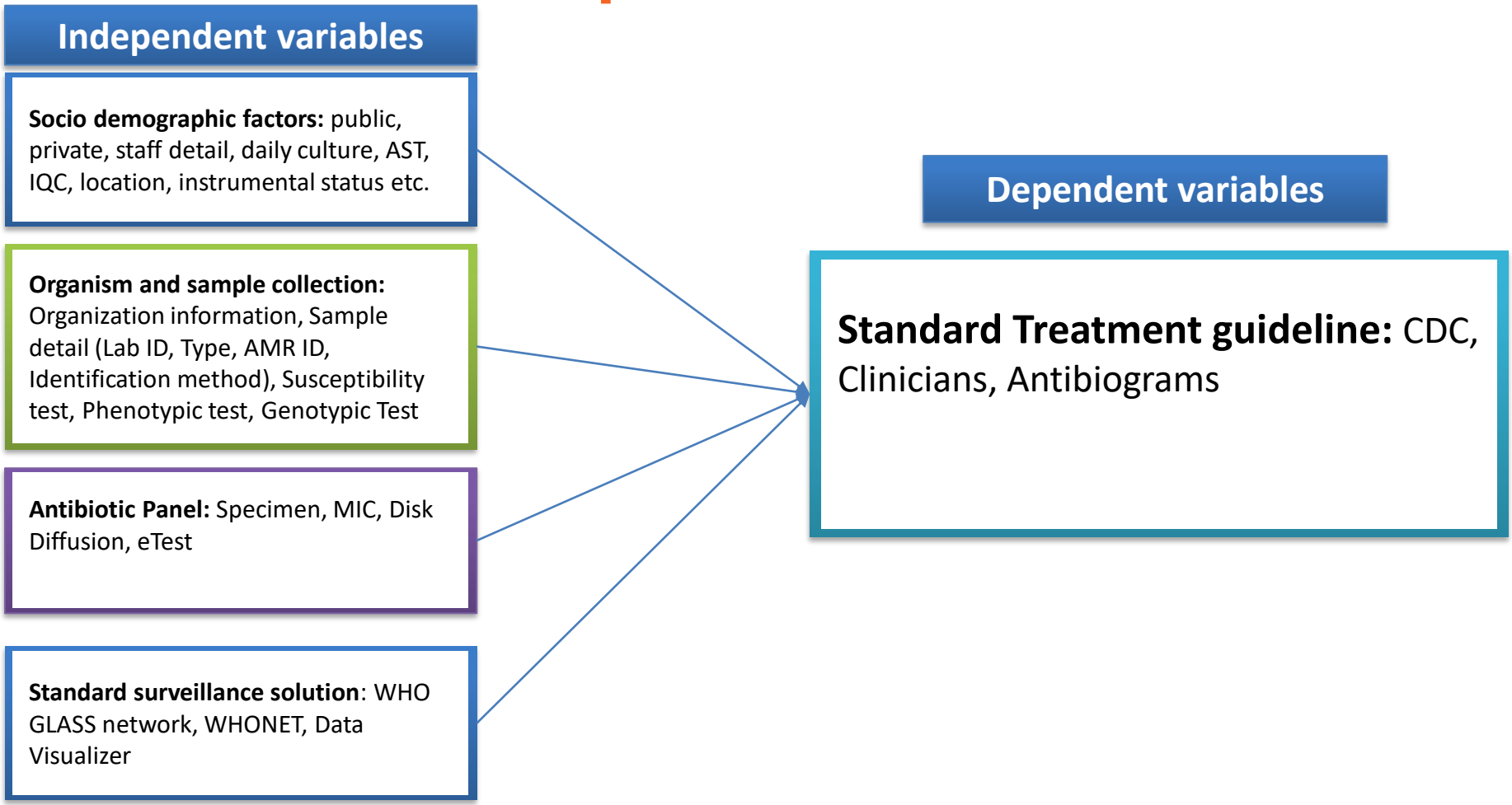
Conceptual Framework



Conceptual Framework



Conceptual Framework



Justification/ rationale

- Updated policy formulation
- Globally integration and affiliation
- Unified data pattern development for the private and public laboratories
- National level single data warehouse development
- Bangladesh Antibiotic National Action Plan (ACP) for the antibiotic containment program under CDC-DGHS

Introduction

Antimicrobial resistance (AMR) is currently considered as an alarming issues in the world and Bangladesh has become one of the major contributor to this issue because of having a poor healthcare system [1]. At present, the rate of AMR is increasing in speedy manner in Bangladesh due to the lack of standard AMR surveillance system. Therefore, we intend to assess the capacity and availability of the electronic surveillance system both in the government and private medical colleges, universities, hospitals, and diagnostic center. We want to see how the standardized approach to the collection, analysis and sharing of AMR data can help to achieve the goals and objectives of the overall national action plan within the specified time period.

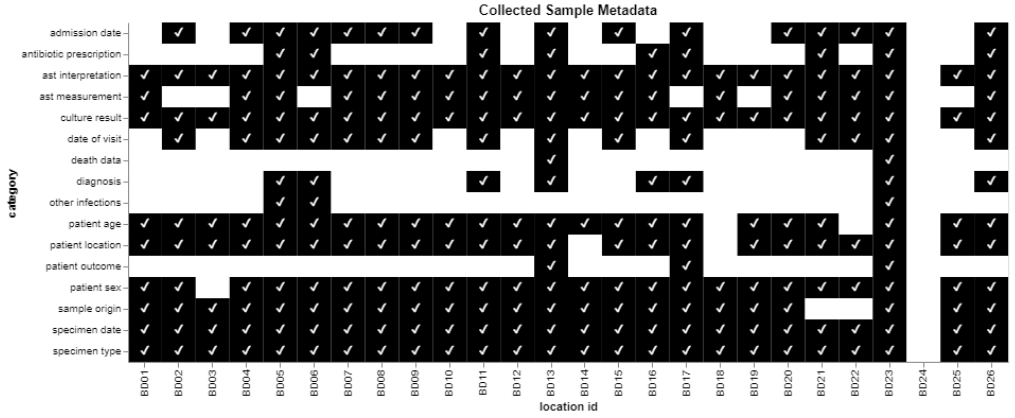
A global emphasis on surveillance and evidence-based research will inform that Member States and intergovernmental agencies can take necessary actions to address the growing health security challenges of antimicrobial resistance[3]. The Communicable Disease Control Program under Directorate General of Health Services (DGHS) has developed a National Action Plan (ACP) on the Antimicrobial Resistance, and it has clearly stated the importance of a strong surveillance system for the Human health, Animal health and Environmental sector.

Methods-Study Design

- The retrospective data of antimicrobial susceptibility testing (AST) were collected and reviewed to identify and evaluate the gaps and capacity of AST in Bangladesh.
- For this at first, we started the selection and screening of laboratories located all over Bangladesh.
- Prior to the selection of the laboratories, we geographically distributed the whole country in eight divisions and collected detailed information of laboratories present in those divisions.
- A questionnaire of Rapid Laboratory Assessment (RLQA) tool was used to assess all the selected laboratories.

Sample Size

- At first, we selected 91 laboratories for this study and communicated with highest number of laboratories to understand their current laboratory capacity and sensitivity testing pattern.
- The information provided by the laboratories was recorded in a database to be used for further screening of laboratories based on some specific criteria.
- After the second screening we have excluded 35 laboratories which do not meet our criteria.
- Out of all the laboratories, we included 45 laboratories for on-site assessments. ***Systematic Random Sampling has been used for this study.***



Current Status of the National Surveillance System

- IEDCR is working on the surveillance of Antimicrobial Resistance in a total of 8 public hospitals and 1 private hospital across the country.
- A total of 35-40 sample case information must be sent every week
- This surveillance was started with the funding of GSHA-WHO in 2017
- It is a web-based software through which information is stored on the server at real time
- Since 2019, IEDCR has been sending their information to the WHO-GLASS platform
- The software collects initial patient information, case details, patient geo-location, lab reports, socio-demographic information, diagnosis detail, and antibiotic resistant information

Role of Antibiotic Containment Program

- The Communicable Disease Control (CDC) under DGHS has completed the formation of different national and local level committees and working group in April 2012 to contain antimicrobial resistance data
- The National Working Group (NWG) has developed some strategic documents such as National Strategy for Antimicrobial Resistance Containment (AMRC), National Action Plan (NAP) on AMRC, National Surveillance System and Laboratory Network.

Overview of Laboratory Capacity

- Still struggling to improve their capacity owing to various reasons
- Firstly, absence of enough equipment facilities is the main hindrance to the capacity development of the laboratories.
- In addition, deficiency of efficient bench staffs, proper standard operating procedures (SOPs), lack of appropriate training facilities and data recording system are also responsible for the poor condition of the laboratories in Bangladesh

National Action Plan

- Establish a web-based national surveillance system and laboratory network on AMR and information dissemination system 6.
- Designate central coordination body and focal point with TOR
- Select regional surveillance laboratories
- Select and train regional surveillance personnel and focal point with TOR
- Develop protocol for surveillance including assign working group and to develop protocol
- Support logistics required for surveillance
- Develop software/ apps for developing laboratory network and information dissemination system

Situation Analysis

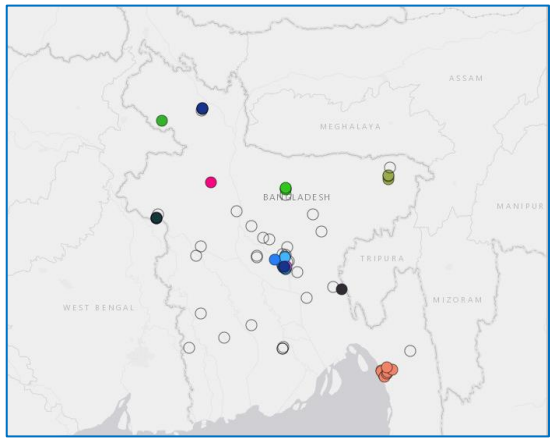
- In Bangladesh it is of great importance to undertake a situational analysis of AMR nationally.
- The problem of AMR is emerging at a high rate due to poor examination and inadequate consultation of patients, improper diagnosis of diseases and inappropriate use of antibiotics
- This analysis contemplated all aspects of a AMR surveillance system, involving sampling, identification methods and procedures as well as data recording system
- For this purpose, the assessment of the laboratories was performed using the Rapid Laboratory Quality Assessment (RLQA) tool, which is combined with the Fleming Fund's Laboratory Assessment Tool, GLASS Laboratory Assessment Tool, GHSA Microbiology Readiness Assessment Tool etc

Inclusion and Exclusion Criteria

- The RLQA tool mainly included the laboratories having some specific criteria such as, current condition and data availability of the laboratories for last three years.
- We also included the laboratory geographic information and demographic characteristics of all the laboratories so that it represents a standard representative dataset
- We excluded some laboratories during primary screening based on some specific characteristics including the quality of test, performance of routine culture, record keeping mechanism etc.

Data Extraction and Analysis

- It is important that methods of data extraction, collection, warehousing and analysis are properly recorded.
- WHO collaborating center software WHONET for the individual laboratories
- According to our assessment, we found 23 labs among 45 are not using any electronic systems to keep their laboratories routine culture information, 9 laboratories are using IEDCR sentinel sites surveillance software and the rest are using their own customized desktop and web-based solutions.
- The collected retrospective data will be primarily stored at a central cloud server and after analysis it will be transferred to the DGHS server.



Results

Software type	Data Frequency (n=45)	Percentage (%)	Antibiogram Status-No	Antibiogram Status-Yes
Desktop Application	13	28.89	11	2
Excel file processing	1	2.22	0	1
Manual Paper Based	19	42.22	16	3
Vitek-2	7	15.56	5	2
Web based Application	3	6.67	2	1
Word file processing	2	4.44	2	0
Total	45	100.00	36 (80%)	9 (20%)

Table-1: Software solution using status and Relationship between the software type and antibiogram status

- Most of the laboratories (42.22%, n=19) don't use any software solution and it is half of the total laboratories.
- Only 28.89% (n=13) laboratories are using their own developed custom application
- The satisfactory number of laboratories (15.56%, n=7) are using the Vitek-2
- Only 20% (n=9) laboratories are utilizing their susceptibility testing data to prepare antibiograms regularly

- Most of the laboratories 80% (n=36) are not preparing any antibiograms for their internal decision making due to the lack of well formatted data.

Variable	Observations	Mean	Std. Dev.	Min	Max
Daily culture	45	38.91111	41.76875	0	200

Table-2: Daily culture frequency

Results (continue…)

- We found one autonomous, 14 public, 30 private labs
- Desktop users 13
- Excel file processing 19
- Web based 3
- Word file processing 2

Software type	Autonomous	Public	Private	Total
Desktop Application	0	0	13	13
Excel file processing	1	12	6	19
Vitek-2	0	1	6	7
Web based Application	0	0	3	3
Word file processing	0	0	2	2
Total	1	14	30	45

Table-3: Association between the software type and laboratory categories.

Discussion

- To develop a laboratory-based surveillance system, it is predominant to follow a routine process involving collection and transportation of specimens for culture and susceptibility testing, and a dynamic laboratory information system (LIS) to report to the surveillance program.
- A strong AMR surveillance system is entirely depending on good quality microbiology laboratories and the data derived from them.

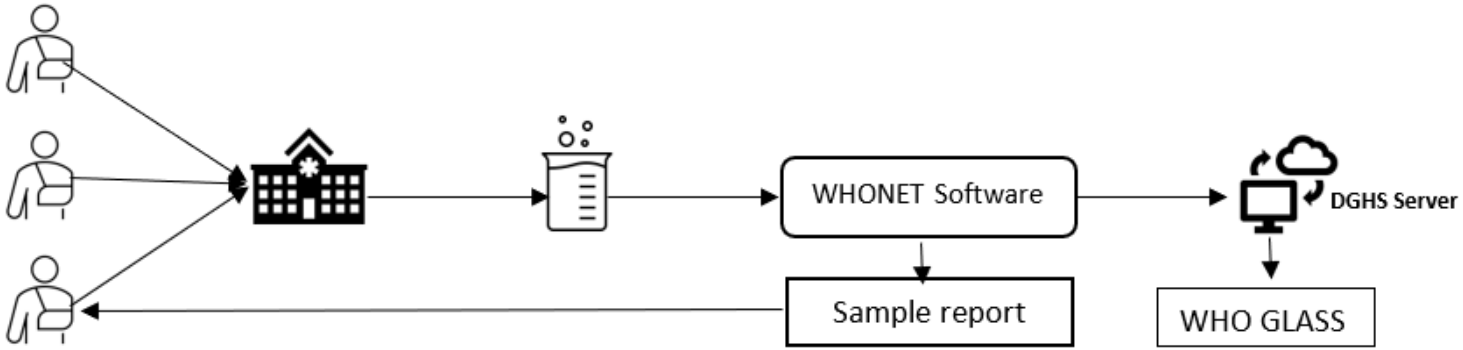


Figure: Antimicrobial susceptibility testing record keeping and integration with central data warehouse and WHO GLASS platform.

Conclusion

According to the AMR National Action Plan (ACP) section 4, we hope the standardized approach to the collection, analysis and sharing of AMR data through an integrated surveillance system can help to impact on the national level decision making, drive local level laboratories and development of standard treatment guidelines.

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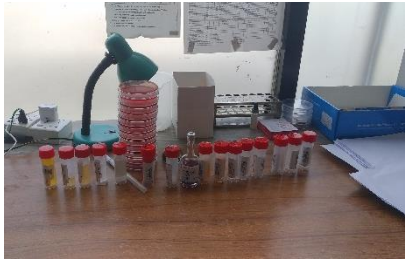
Laboratory Assessment and Data Collection




Thanks

Any queries?